Shah Lem:
A Shear-Led Closure Theorem for Defect-Bearing Transport

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Abstract

We formulate Shah Lem as a closure theorem for transport systems whose return is mediated by a self-inverse shear operator and an explicit metric-defect ledger. The theorem states that closure need not be primitive identity; it may occur through reversible shear together with accounted residue.

1 Framework

Definition 1 (Carrier state)**.** *Let X be a state space and let $x \in X$ be an admissible carrier state.*

Definition 2 (Metric-defect ledger)**.** *Let*

$$\delta_G : X \to V$$

be the defect map into a ledger space V.

Definition 3 (Shear involution)**.** *Let*

$$\mathcal{S}_\sigma : X \to X$$

be a shear operator satisfying

$$\boxed{\mathcal{S}_\sigma^2 = I.}$$

Definition 4 (Transport law)**.** *A defect-bearing transport law is a map*

$$\mathcal{T} : X \to X \times V, \qquad \mathcal{T}(x) = (\mathcal{S}_\sigma x, \delta_G(x)).$$

2 Shah Lem

Theorem 1 (Shah Lem)**.** *Let $x \in X$ be admissible. Assume:*

1. *$\mathcal{S}_\sigma^2 = I$,*
2. *the defect ledger $\delta_G(x)$ is explicitly retained,*
3. *closure is evaluated on the pair $(\mathcal{S}_\sigma x, \delta_G(x))$, not on the transported state alone.*

Then the return of the system is not primitive circularity. Rather, it is a shear-led closure:

$$x \mapsto (\mathcal{S}_\sigma x, \delta_G(x)) \mapsto (x, \delta_G(\mathcal{S}_\sigma x)),$$

so that closure occurs through reversible shear with registered defect.

Proof. Since $\mathcal{S}_\sigma^2 = I$, the carrier component returns after two passes. However, because the defect is retained in the ledger, the return is not bare repetition of the initial state. Thus the loop closes by self-inverse transport plus bookkeeping, not by empty identity. □

Corollary 1 (Non-vicious return)**.** *A loop governed by Shah Lem is not vicious circularity unless the ledger is erased.*

Remark 1. *The content of Shah Lem is that identity after transport is a constructed return, not a primitive given.*